

## **Environmental Assessment Scoping Report**

**for: THE ESTABLISHMENT AND MINING OF  
DIMENSION STONES, ON MINING CLAIM 69151 AT  
OROUTUMBA VILLAGE, SWAARTBOOISDRIFT,  
OPUWO DISTRICT, KUNENE REGION.**

**May 2023**



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CONSULTANTS CC**

### PROJECT DETAILS

<b>Title</b>	Environmental Scoping Report for the establishment and mining of dimension stones, on mining claim 69151 at Oroutumba Village, Swartbooisdrift , Opuwo District, Kunene Region.		
<b>Report Status</b>	Final		
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## LIST OF ACRONYMS

AIDS	Acquired immune deficiency syndrome
CRR	Comments and response report
dB	Decibels
FESR	Final Environmental Scoping Report
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EAR	Environmental Assessment Report
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
EPL	Exclusive Prospecting Licence
FEAR	Final Environmental Assessment Report
GTZ	Gesellschaft für Technische Zusammenarbeit
HEEC	Healthy Earth Environmental Consultants CC
HIV	Human immunodeficiency virus
I&AP	Interested and Affected Party
IUCN	International Union for Conservation of Nature
MC	Mining Claim
MEFT	Ministry of Environment, Forestry and Tourism
MEFT: DEA	Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs
MME	Ministry of Mines and Energy
PPP	Public participation process
PHC	Public health and safety
SADC	Southern African Development Community
USAID	United States Agency for International Development
VMMC	Voluntary Medical Male Circumcision

## 1 INTRODUCTION

---

### 1.1 PROJECT BACKGROUND

Mining contributes to 25% of the country's income. It is the largest contributor to the Namibian economy. Namibia has various natural resources including diamonds, uranium, copper, gold, lead, tin, lithium, cadmium, zinc, salt and vanadium. In 2015 the mining industry accounted for approximately 19,000 jobs in Namibia vs. 14,000 in 2011. Indirectly the mining industry contributes to the livelihood of 100 000 people. Approximately N\$ 55 million is spent on training and skills development. Between 300 and 500 artisans are qualified each year by The Namibian Institute of Mining and Technology (NIMT). Five major companies account for 95% of the mining income. Diamond and uranium mining are by far the two most vital industries in Namibia (<http://www.bdo.com.na/en-gb/industries/natural-resources/mining-in-namibia> , accessed 5/5/2023)

Dimension stone is an important building material used worldwide, and therefore a valuable natural resource. Namibia has numerous deposits of good quality dimension stone displaying a variety of attractive colors, patterns, and textures. The main rock types quarried are marble, granite, dolerite, conglomerate, and sodalite. The Government of Namibia recognises that the exploration and development of its mineral wealth could best be undertaken by the private sector. Government therefore focuses on creating an enabling environment through appropriate competitive policy and regulatory frameworks for the promotion of private sector investment coupled with the provision of national geo-scientific data bases essential for attracting competitive exploration and mining (Draft Minerals Policy of Namibia, MME).

It is with this background that **Mr. Hosea Kazepurua** has decided to mine dimension stones for export purposes to China via the Walvis Bay Port and derive the monetary benefits associated with these natural resources as he is a holder of a mining claim 69151 from the Ministry of Mines and Energy after following all the necessary procedures to satisfy the relevant Authorities enabling them to mine the dimension stones from the allocated portion on the Zebra Mountains.

However uncontrolled natural resource mining/ excavation has resulted in negative environmental effects in the respective areas. This has been largely attributed to the fact that people were under no obligation to rehabilitate the affected areas and thus left behind large open pits/quarries which pose a danger to both humans and animals.

**Mr. Hosea Kazepurua**, hereinafter referred to as the proponent intends to carry out the following activity:

- **Environmental Assessment (EA) for the establishment and mining of dimension stones, on mining claim 69151 at Oroutumba Village, Swartbooisdrift, Opuwo District, Kunene Region.**

The objective of the intended Environmental Assessment is thus needed in order to assess the potential social and environmental impacts associated with the proposed mining activities of dimension stones, on mining claim 69151 at Oroutumba Village, Swartbooisdrift, Kunene Region and also to formulate methods of rehabilitation of the quarries once the dimension stones have been excavated.

The above is a listed activity in terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012).

In terms of the Environmental Management Act (No. 7 of 2007) and Environmental Impact Assessment Regulations (Government Notice No. 30 of 2012), the following listed activities in **Table 1** were triggered by the proposed project:

**Table 1:** List of triggered activities identified in the EIA Regulations which apply to the proposed project

<b>Activity description and No(s):</b>	<b>Description of relevant Activity</b>	<b>The portion of the development as per the project description that relates to the applicable listed activity</b>
<b>Activity 3.1</b> (Mining and Quarrying Activities)	The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.	The proposed project includes the mining of dimension stones for export purposes.
<b>Activity 3.2</b> (Mining and Quarrying Activities)	Other forms of mining or extraction of any natural resources whether regulated by law or not.	The proposed project includes the mining of dimension stones for export purposes.
<b>Activity 3.3</b> (Mining and Quarrying Activities)	Resource extraction, manipulation, conservation, and related activities.	The proposed project includes the mining of dimension stones for export purposes.

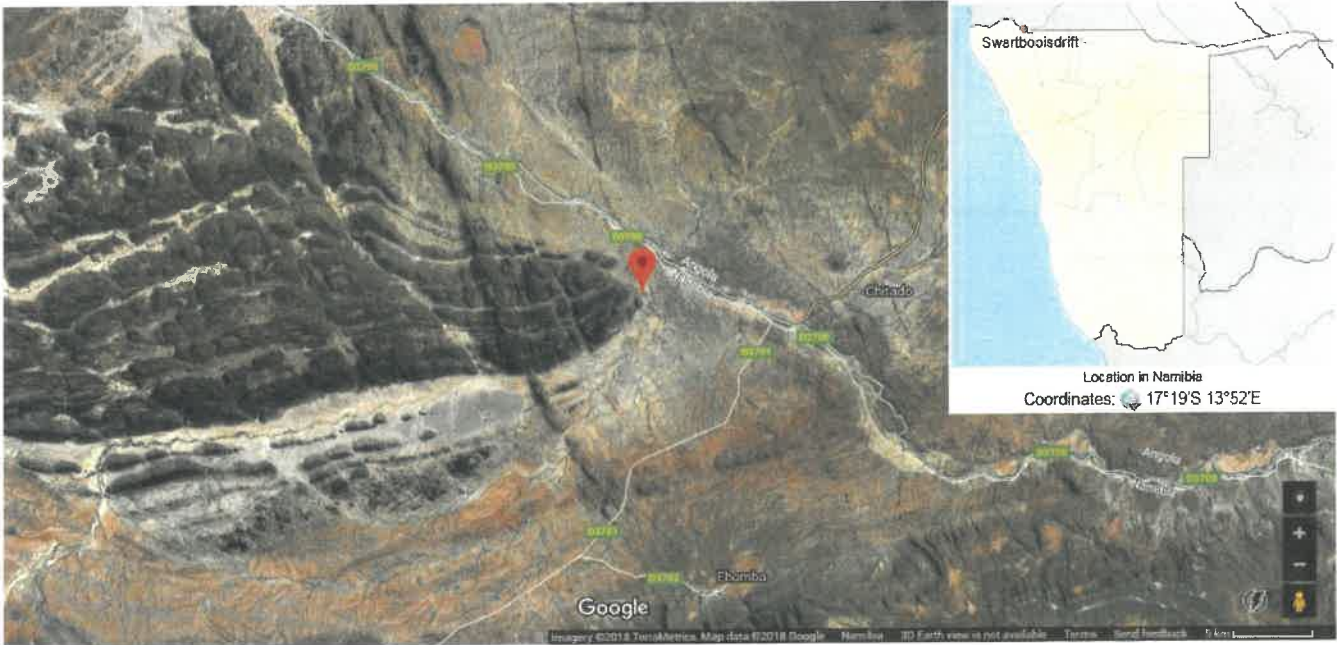


The above activities will be discussed in more detail in Chapter 4. Healthy Earth Environmental Consultants CC (HEEC) intends to undertake an independent Environmental Assessment (EA) in order to obtain an Environmental Clearance Certificate (ECC) for the above activities on behalf of the proponent. The competent authority is the Ministry of Environment, Forestry and Tourism: Department of Environmental Affairs (MEFT: DEA).

The EA process was undertaken in terms of the gazetted Namibian Government Notice No. 30 Environmental Impact Assessment Regulations (herein referred to as EIA Regulations) and the Environmental Management Act (No 7 of 2007) (herein referred to as the EMA). The EA process investigated if there are any potential significant bio-physical and socio-economic impacts associated with the intended mining activities. The EA process also served to provide an opportunity for the public and key stakeholders to provide comments and participate in the process, i.e. Integrated Environmental Principles were adhered to.

**1.2 PROJECT LOCATION**

The proponent intends to mine dimension stones on a mining claim at Oroutumba Village, Swartbooisdrift, Opuwo district, located about 7 km from the D3701 gravel road from Opuwo to Ruacana as shown in **Figure 1** and **Figure 2** for the locality of the mining claim 69151 for the dimension stones.

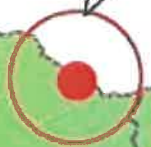


**Figure 1:** Locality map of Oroutumba, Swartbooisdrift, Kunene Region (Google 2023).

# LOCALITY MAP OF MINING CLAIM 69151



Mining Claims Locality



## Angola



### Legend

- Towns
- District Roads
- Main Roads
- Trunk Roads
- Regions

Client:



Designed By: Geo Spatial Services cc  
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Call: +264 91 211 3132

Date: June 2023

Scale = 1:5 000 000





**LOCALITY MAP OF MINING CLAIM 69151**

**MC 69151**  
**Area = ±17.68 Ha**



MC 69151		
CORNER	LAT	LONG
A	-17.319970°	13.763265°
B	-17.322811°	13.768065°
C	-17.325159°	13.766813°
D	-17.322426°	13.762009°

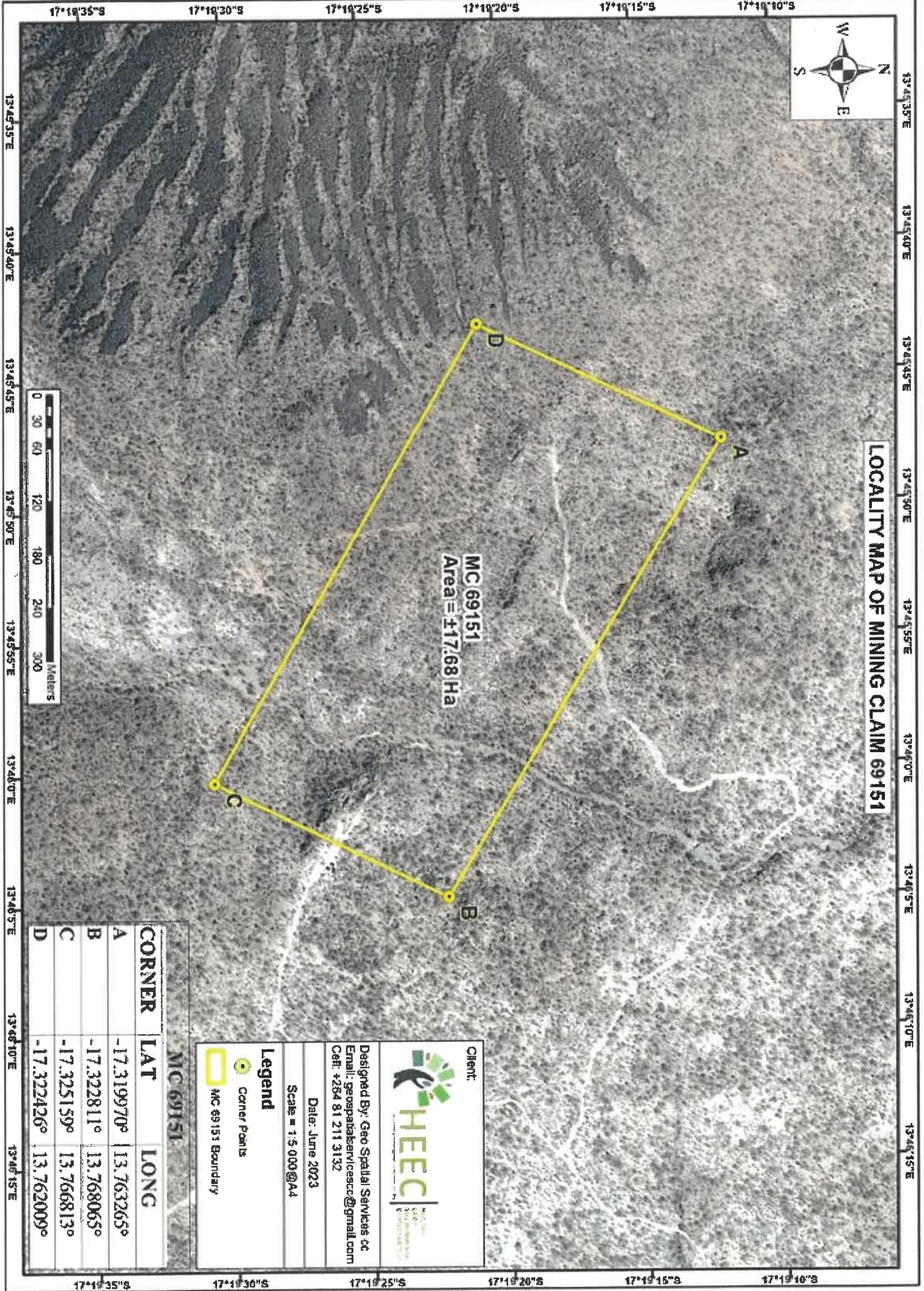
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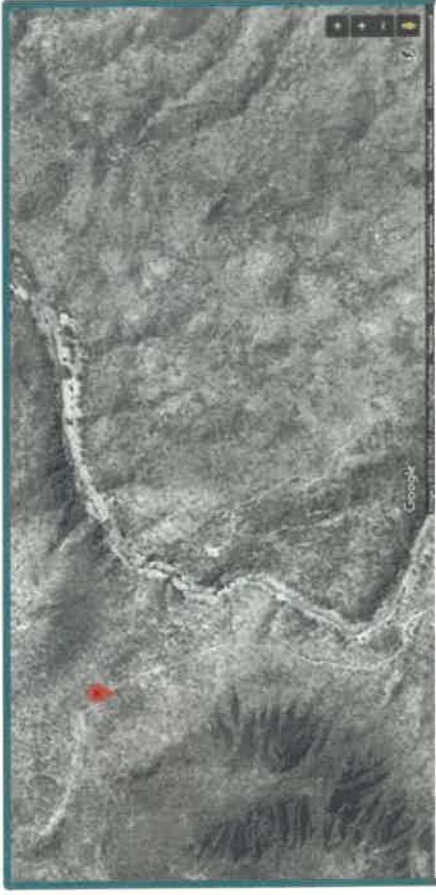
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- Legend**
-  Corner Points
  -  MC 69151 Boundary





**Figure 2:** Locality map of the mining claim 69151 site (red pin) at Oroutumba Village (Google, 2023).

### 1.3 TERMS OF REFERENCE AND SCOPE OF PROJECT

The scope of this project is limited to conducting an Environmental Assessment (EA) for the establishment and mining of dimension stones on mining claim 69151 at Oroutumba Village, Swartbooisdrift, Kunene Region and applying for an Environmental Clearance Certificate as indicated in section 1.1 above.

### 1.4 ASSUMPTIONS AND LIMITATIONS

In undertaking this investigation and compiling the Environmental Assessment Report, the following assumptions and limitations apply:

- Assumes the information provided by the proponent (**Mr. Hosea Kazepurua**) is accurate and discloses all information available.
- The unique character and appeal of the surrounding area of the Swartbooisdrift will be taken into consideration with the design & operational perspective for the intended activities. Various layout alternatives will be considered by the proponent, also taking terrain and environmental constraints into account, thus only adopting the most economically feasible & environmentally friendly result.

### 1.5 CONTENT OF ENVIRONMENTAL ASSESSMENT REPORT

Section 8 of the gazetted EIA Regulations requires specific content to be addressed in a Scoping / Environmental Assessment Report. **Table 2** below is an extract from EMA and highlights the required contents of a Scoping / Environmental Assessment Report whilst assisting the reader to find the relevant section in the report.

**Table 2:** Contents of the Scoping / Environmental Assessment Report

Section	Description	Section of FESR/ Annexure
8 (a)	The curriculum vitae of the EAPs who prepared the report;	Refer to <b>Annexure F</b>
8 (b)	A description of the proposed activity;	Refer to Chapter 4
8 (c)	A description of the site on which the activity is to be undertaken and the location of the activity on the site;	Refer to Chapter 3
8 (d)	A description of the environment that may be affected by the proposed activity and	Refer to Chapter 3

Section	Description	Section of FESR/ Annexure
	the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	
8 (e)	An identification of laws and guidelines that have been considered in the preparation of the scoping report;	Refer to Chapter 2
8 (f)	Details of the public consultation process conducted in terms of regulation 7(1) in connection with the application, including	Refer to Chapter 5
	(i) the steps that were taken to notify potentially interested and affected parties of the proposed application	Refer to Chapter 5
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	Refer to <b>Annexures A and B</b> for site notices and advertisements respectively.
	(iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 22 as interested and affected parties in relation to the application;	Refer to <b>Annexure D</b>
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	Refer to <b>Annexure D</b>
8 (g)	A description of the need and desirability of	Refer to Chapter 4

Section	Description	Section of FESR/ Annexure
	the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;	
8 (h)	A description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Refer to Chapter 7
8 (i)	Terms of reference for the detailed assessment;	NA – Assessment of impacts are included in this EA Report
8 (j)	An Environmental Management Plan (EMP)	Refer to <b>Annexure G</b>

## 2 LEGAL FRAMEWORK

There are multiple legal instruments that regulate and have a bearing on good environmental management in Namibia. **Table 3** below provides a summary of the legal instruments considered to be relevant to this development and the environmental assessment process.

**Table 3:** Legislation applicable to the establishment and mining of dimension stones on mining claim 69151 at Oroutumba Village, Swartbooisdrift, Kunene Region

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
The Constitution of the Republic of Namibia as Amended	<p>Article 91 (c) provides for duty to guard against “the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia.”</p> <p>Article 95(l) deals with the “maintenance of ecosystems, essential ecological processes and biological diversity” and sustainable use of the country’s natural resources.</p>	Sustainable development should be at the forefront of management of the proposed mining activities.
Environmental Management Act No. 7 of 2007 (EMA)	<p>Section 2 outlines the objective of the Act and the means to achieve that.</p> <p>Section 3 details the principles of Environmental Management</p>	The management of this project should be informed by the EMA.
EIA Regulations GN 28, 29, and 30 of EMA (2012)	<p>GN 29 Identifies and lists certain activities that cannot be undertaken without an environmental clearance certificate.</p> <p>GN 30 provides the regulations governing the environmental assessment (EA) process.</p>	<p><b>Activity 3.1 (Mining and Quarrying Activities)</b> The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992.</p> <p><b>Activity 3.2 (Mining and Quarrying Activities)</b> Other</p>



LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
		forms of mining or extraction of any natural resources whether regulated by law or not. <b>Activity 3.3 (Mining and Quarrying Activities)</b> Resource extraction, manipulation, conservation and related activities.
Convention on Biological Diversity (1992)	Article 1 lists the conservation of biological diversity amongst the objectives of the convention.	The dimension stone mining activities should consider the impact it will have on the biodiversity of the area.
Draft Procedures and Guidelines for conducting EIAs and compiling EMPs (2008)	Part 1, Stage 8 of the guidelines states that if a proposal is likely to affect people, certain guidelines should be considered by the proponent in the scoping process.	The EA process should incorporate the aspects outlined in the guidelines.
Namibia Vision 2030	Vision 2030 states that the solitude, silence and natural beauty that many areas in Namibia provide are becoming sought after commodities and must be regarded as valuable natural assets.	Care should be taken that the dimension stone mining activities do not lead to the degradation of the natural beauty of the area.
Water Act No. 54 of 1956	Section 23(1) deals with the prohibition of pollution of underground and surface water bodies.	The pollution of water resources should be avoided during the dimension stone mining activities.
The Ministry of Environment, Forestry and Tourism (MET) Policy on HIV & AIDS	MET has recently developed a policy on HIV and AIDS. In addition it has also initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.	The proponent and its contractor have to adhere to the guidelines provided to manage the aspects of HIV/AIDS. Experience with similar projects has shown that a significant health risk is created when migrant mine workers/labourers interact with local communities.
Labour Act No. 11 of 2007	Chapter 2 details the fundamental rights and protections.	Given the employment opportunities presented by the

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	Chapter 3 deals with the basic conditions of employment.	dimension stone mining activities, compliance with the law is essential.
Public and Environmental Health Act of 2015	This Act (GG 5740) provides a framework for a structured uniform public and environmental health system in Namibia. It covers notification, prevention and control of diseases and sexually-transmitted infections; maternal, ante-natal and neo-natal care; water and food supplies; infant nutrition; waste management; health nuisances; public and environmental health planning and reporting. It repeals the Public Health Act 36 of 1919 (SA GG 979).	The dimension stone mining activities are to comply with these legal requirements.
Nature Conservation Ordinance No. 4 of 1975	Chapter 6 provides for legislation regarding the protection of indigenous plants.	Indigenous and protected plants must be managed within the legal confines.
Environmental Assessment Policy of Namibia (1995)	The Policy seeks to ensure that the environmental consequences of development projects and policies are considered, understood, and incorporated into the planning process, and that the term ENVIRONMENT is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.	This EA considers this term of Environment.
Minerals (Prospecting and Mining) Act, 1992 (Act 33 1 of 1992)	To provide for the reconnaissance, prospecting and mining for, and disposal of, and the exercise of control over, minerals in Namibia; and to provide for matters	The intended activity involves the mining of dimension stones for export purposes.

LEGISLATION/POLICIES	RELEVANT PROVISIONS	RELEVANCE TO PROJECT
	incidental thereto. “mineral” means any substance, whether in solid, liquid or gaseous form, occurring naturally in, on or under any land and having been formed by, or subjected to, a geological process, excluding -(c) subject to the provisions of subsection (2), soil, sand, clay, gravel or stone (other than rock material specified in Part 2 of Schedule 1) if they are bona fide required for purposes of - (i) agriculture, building works, fencing or road making; (ii) the manufacture of bricks and tiles;	
Soil Conservation Act 6 of 1969 Ministry of Agriculture, Water and Forestry	This Act covers the prevention and combating of soil erosion; the conservation, improvement and manner of use of the soil and vegetation; and the protection of water sources	Quarries left behind after dimension stone mining should not be polluted or left un-rehabilitated.

This EA process will be undertaken in accordance with the EIA Regulations. A Flow Diagram (refer to **Figure 3**) provides an outline of the EIA process to be followed.

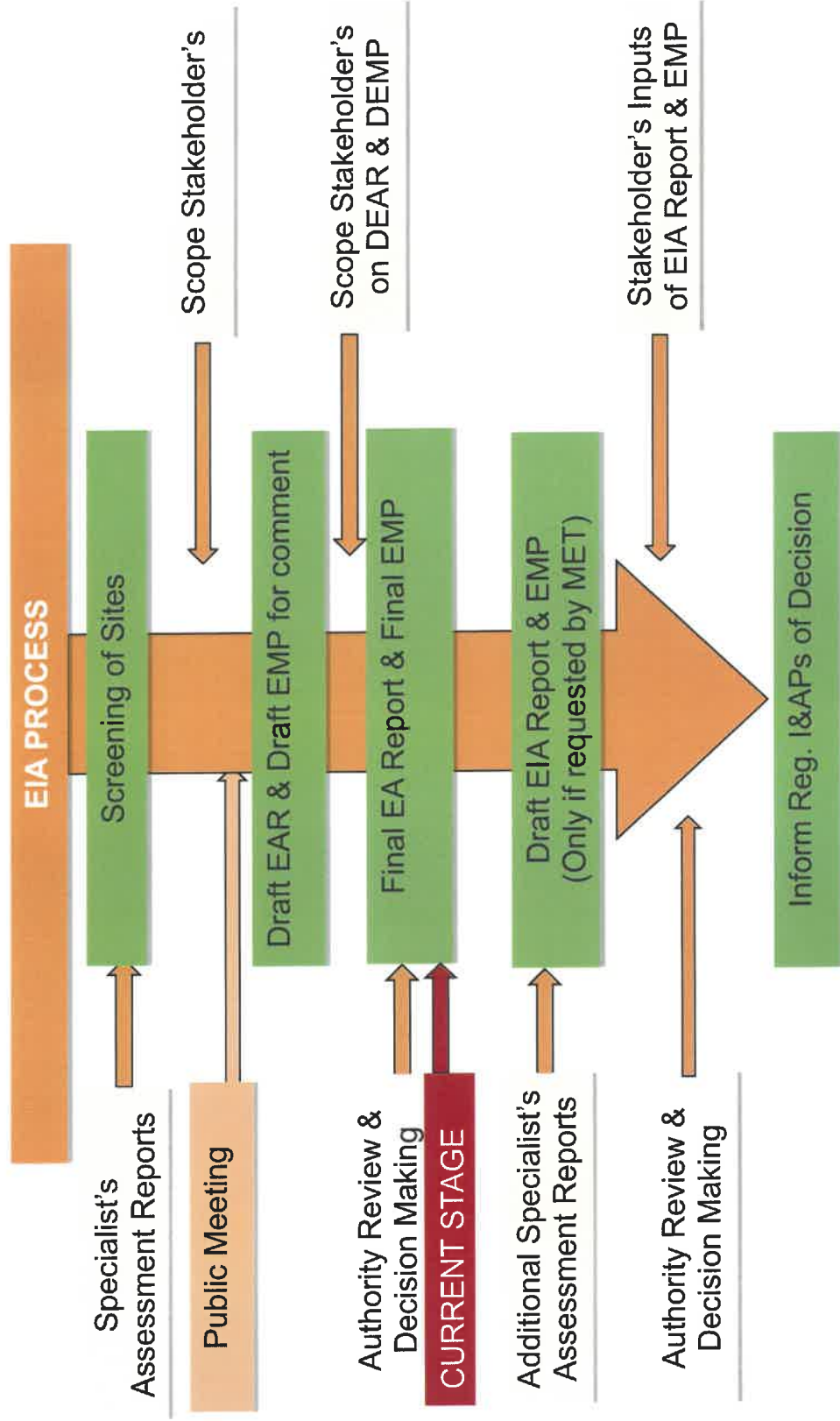


Figure 3: EIA flow Diagram

### 3 ENVIRONMENTAL BASELINE DESCRIPTION

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#### 3.1 SOCIAL ENVIRONMENT

##### 3.1.1 Socio-Economic Context

Kunene (also known as **Kaokoland**) is one of the fourteen regions of Namibia. The region's name is derived from Kunene River which forms the region's northern border with Angola. Swartbooisdrift is a small settlement in Kunene Region in the north of Namibia. It is situated on the banks of the Kunene River, directly at the Angolan border on the minor road D3700 and falls within the Epupa electoral constituency. Swartbooisdrift is populated by 150 - 300 semi-nomadic people of Himba and Herero descent, depending on the season (*"Swartbooisdrift - Location". Kunene for Christ, Accessed 5/5/2023*).

The settlement is named after Petrus Swartbooi, one of the tribal chief captains of the Swartbooi Nama who raided the area in the 1890s ( *"Ruacana Falls to Epupa Falls 4x4 route". Tournamibia.net. Retrieved 15 January 2011, Accessed 5/5/2023*).

Swartbooisdrift has some historic significance as the place where Dorsland Trekkers crossed the Kunene River in 1881 to move into Angola ( *Dierks, Klaus. "Chronology of Namibia History, 1881/82". Retrieved 5 July 2010, Accessed 5/5/2023*) In commemoration of this migratory movement the Dorsland Trekkers Monument has been erected on a hill just outside the settlement.[4]

Swartbooisdrift was the administrative centre of the Kaokoland from 1925 to 1939. Afterwards, administrative control of the area shifted to Ohopoho (today's Opuwo). During that time a police station was operational at the settlement. From 1938 to 1942, the settlement was one of a number of guard posts set up on all shallow stretches of the Kunene to prevent the spread of cattle lung disease into Namibia ( *"Ruacana Falls to Epupa Falls 4x4 route". Tournamibia.net. Retrieved 15 January 2011, Accessed 5/5/2023*).

Swartbooisdrift is a poor settlement with no access to electricity or clean water (*"Swartbooisdrift - Location". Kunene for Christ, Accessed 5/5/2023*).but features a clinic and a school. People live from subsistence cattle farming. There is a sodalite mine to the east (*"The People of Swartbooisdrift". Kunene for Christ, Accessed 5/5/2023*).

Kunene region comprises of six (7) constituencies, namely: Epupa (in which the dimension stone mining claim 69151 is located), Kamanjab, Khorixas, Opuwo Rural, Opuwo Urban, Outjo and Sesfontein.

### 3.1.2 Archaeological and Heritage Context

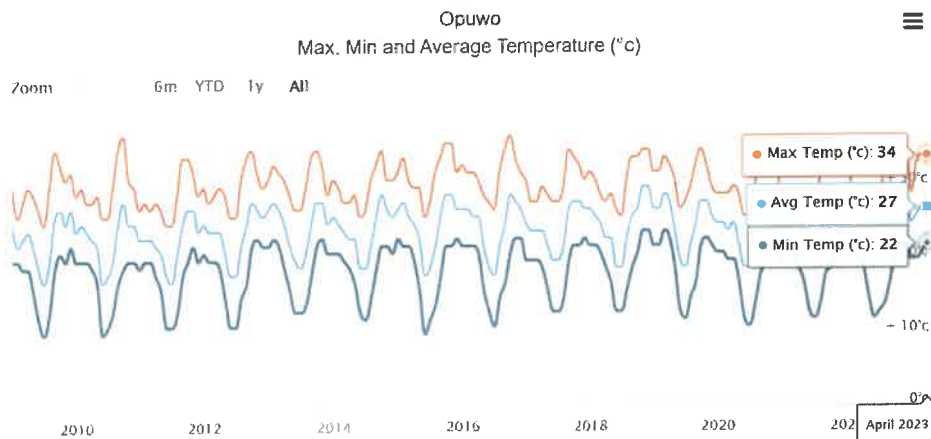
While there are no declared heritage sites by the National Heritage Council of Namibia on the mining claim 69151 at Oroutumba Village, Swartbooisdrift, Kunene Region, an accidental find procedure at the subject site may be required.

## 3.2 BIO-PHYSICAL ENVIRONMENT

### 3.2.1 Climate

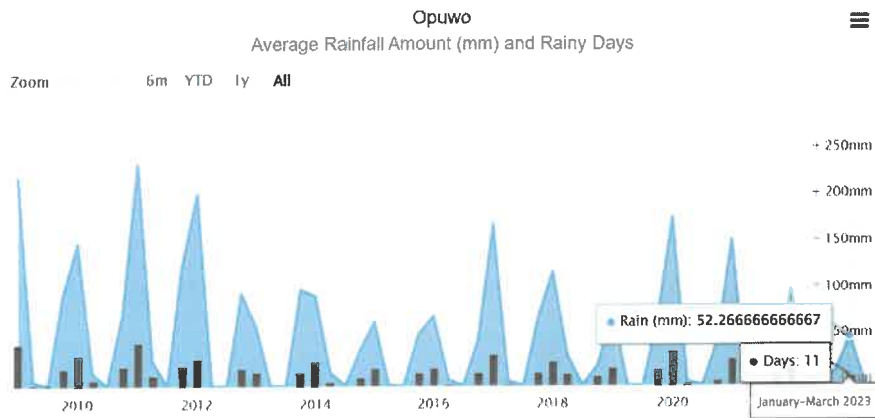
The climate at Oroutumba Village, Swartbooisdrift where the dimension stone mining claim 69151 is located is mostly semi-arid to arid, analogous to a desert climate where annual rainfall rarely exceeds 300 mm. The Desert climate (in the Köppen climate classification BWh and BWk, sometimes also BWn), also known as an arid climate, is a climate in which precipitation is too low to sustain any vegetation at all, or at most a very scanty shrub. The greatest amount of precipitation occurs in February, whereas the least amount of rainfall occurs in July. The area is characterized by hot dry summers with daytime temperature in excess of 30°C whereas the night time temperatures can go only as low as about 10°C, due to the desert climate (worldweatheronline, 2023) as indicated in **Figure 4**.

### Yearly Max, Min and Average Temperature



**Figure 4:** Temperature Graph for Opuwo near Oroutumba Village (worldweatheronline, 2023).

## Yearly Rainfall and Rain Days Averages



**Figure 5: Rainfall Graph for Opuwo near Oroutumba Village (worldweatheronline, 2023).**

An understanding of climatic conditions, in particular rainfall, is important in determining the risk of flooding and erosion, which for this project is mostly of concern during the dimension stone extraction phase. The area may be subject to summer rains in the months of December to March, when the ephemeral streams may flow for a period of two weeks or less. The total rainfall during this period usually exceeds 90 mm. There is little rainfall throughout the year in the area, with the highest rainfall recorded in this year's rainy season of Jan-Mar 2023 recording about 52 mm over 11 rainy days as depicted in **Figure 5** above.

### 3.2.2 Topography, Geology and Hydrogeology

The dimension stone mining claim area falls in the Kunene Region is located on the north-western part of the country which consists of a variety of rock formations, most of them exposed in a rugged landscape of valleys, escarpments, mountains, and large open plains. The topography of the Kunene region is noticeably mountainous and is characterised by rugged mountains which are dissected by numerous watercourses, but north of the Hoarusib River the scenery is dominated by table-top koppies. Still further north, the Otjihipa Mountains rise abruptly above the Namib floor to form the eastern boundary of the Marienfluss, while the west of the valley is defined by the Hartmann Mountains. Except for the Kunene River all rivers in this region are ephemeral. The Kunene region usually experiences extreme dry conditions as a result of abandoned rainfall over the years. Given the relatively low rainfall experienced in the region, vegetation is generally sparse with few trees and a thin covering of grass (Mendelsohn, 2007).

Kaokoland is bordered on the south the Hoanib River and on the north the Kunene River which also forms Namibia's border with Angola. Mountain ranges near the Kunene River are rugged and impressive with the highest point located at 2039m in the Baynes Mountains. It is an oddity that a river runs through this arid landscape with the only real waterfalls in Namibia along its course. The

region also has low groundwater potential aggravated by the sparse knowledge of the aquifers in the area (<http://www.namibian.org/travel/namibia/kaokoland.htm> , accessed 6/5/2023).

There is no bulk water supply from NamWater to the mining claim area and water for human consumption is fetched at a borehole that was drilled at near the mining Claim 69151. For operation purposes of the mine machinery to cool it off when cutting the dimension stones water will be sourced at this borehole. See the **Figure 6** below, showing the truck ferrying water from the borehole.



**Figure 6:** Truck carrying water from the borehole for use at the mining claim 69151 (HEEC, 2023).



### 3.2.3 Terrestrial Ecology

#### 3.2.3.1 Land use patterns and impact on vegetation

The establishment and mining of dimension stones, on a mining claim 69151 at Oroutumba Village, Swartbooisdrift, Opuwo district, Kunene Region, will take place on granite koppies located at Zebra mountains north of Oroutumba Village, about 7 kilometer from the D3701 from Opuwo to Ruacana. The surroundings of the proposed area is well vegetated and it is characterized by mixed-mopane savannah which contain heterogeneous species of plants, predominated by species such as *Colophospermum mopane*, *Catophractes alexandrii*, *Dichrostachys cinerea*, *Combretum apiculatum* subsp. *apiculatum*, *Commiphora mollis*, *Terminalia prunioides*, *Dichrostachys cinerea*, *Sterculia africana*, *Acacia senegal* var. *rostrata*, *Acacia sieberiana* var. *woodii* while species such as *Adenium boehmianum*, *Aloe littoralis*, *Acacia erubescens*, *Bauhinia petersiana* subsp. *Macrantha*, *Boscia albitrunca*, *Boscia microphylla*, *Combretum imberbe*, *Commiphora multijuga*, *Commiphora oblanceolata*, *Euphorbia guerichiana* and *Barleria elegans* are quite common in the area. Although the botanical assessment was carried out in April 2023 the area was dry, hence the species list for the quarter degree squares was extracted from Botanical Research and Herbarium Management System (BRAHMS) to augment the list of plant recorded in the area. The mining claim were the proposed activity will take place, are located at Oroutumba Village, Swartbooisdrift, Opuwo district, Kunene Region, and livestock farming is the only main activity in the area, therefore the owner of the mining claims is planning to venture into dimension stones mining in order to diversify the economic activity in the area and create employment opportunity to the youths in the area.

#### 3.2.4 Methodology and Approach

The impact of the proposed development on vegetation was carried out through a site visit, which was conducted in April 2023, and a thorough botanical assessment was carried out in the area by means of field observations, recording and collecting were it deems necessary. This is the same method which being carried out by many botanists around the globe for collecting herbarium specimens and it's the similar methods employed by the National Herbarium of Namibia. The assessment was further amplified with the use of the species lists of plant occurring within the quarter degree squares (QDS) which was extracted from the database, Botanical Research and Herbarium Management (BRAHMS) which is housed at the National Botanical Research Institute, (NBRI) in Windhoek. The protection status and conservation categories of the plants were extracted from A Checklist of Namibian Indigenous and Naturalised Plants, Occasional Contribution No. 5, field guide by Mannheimer, C. & Curtis, B. A. (eds) 2009; Le Roux and Müllers Field Guide to the Trees and Shrubs of Namibia. Windhoek: Macmillan.

### 3.2.5 Description of the vegetation on the proposed mining claim areas

The area ear-marked for the establishment and mining of dimension stones, on mining claim 69151 at Oroutumba Village, Swartbooisdrift, Opuwo district, Kunene Region, will take place on granite intrusion located on the Zebra mountains north of Oroutumba Village, about 7 kilometres from the D3701 from Opuwo to Ruacana. The surroundings of the proposed area are well vegetated and it is characterized by mixed-mopane savannah which contain heterogeneous species of plants, predominated by species such as *Colophospermum mopane*, *Catophractes alexandrii*, *Dichrostachys cinerea*, *Combretum apiculatum*. subsp. *apiculatum*, *Commiphora mollis*, *Terminalia prunioides*, *Dichrostachys cinerea*, *Sterculia africana*, *Acacia senegal*. var. *rostrata*, *Acacia sieberiana*. var. *woodii* while species such as *Adenium boehmianum*, *Aloe littoralis*, *Acacia erubescens*, *Bauhinia petersiana* subsp. *Macrantha*, *Boscia albitrunca*, *Boscia microphylla*, *Combretum imberbe*, *Commiphora multijuga*, *Commiphora ob lanceolata*, *Euphorbia guerichiana* and *Barleria elegans* are quite common in the area. Since the botanical assessment was carried out in April 2023 the area was dry, hence the species list for the quarter degree squares was extracted from Botanical Research and Herbarium Management System (BRAHMS) to augment the list of plants recorded in the area. The surroundings of the proposed area for the establishment and mining of dimension stones are well vegetated and it is characterized by mixed-mopane savannah which contain heterogeneous species of plants, predominated by species such as *Colophospermum mopane*, *Catophractes alexandrii*, *Dichrostachys cinerea*, *Combretum apiculatum*. subsp. *apiculatum*, *Commiphora mollis*, *Terminalia prunioides*, *Dichrostachys cinerea*, *Sterculia africana*, *Acacia senegal*. var. *rostrata*, *Acacia sieberiana*. var. *woodii* while species such as *Adenium boehmianum*, *Aloe littoralis*, *Acacia erubescens*, *Bauhinia petersiana* subsp. *Macrantha*, *Boscia albitrunca*, *Boscia microphylla*, *Combretum imberbe*, *Commiphora multijuga*, *Commiphora ob lanceolata*, *Euphorbia guerichiana* and *Barleria elegans* are quite common in the area. Although the botanical assessment was carried out in April 2023 the area was dry, hence the species list for the quarter degree squares was extracted from Botanical Research and Herbarium Management System (BRAHMS) to amplify the list of plants recorded in the area. According to Mannheimer, C. A. & Curtis, B. A. (2009) *Colophospermum mopane* are some of the dominant plants in many parts of Namibia. Mopane had distinct uses in the country for instance the bark fibers of young mopane is used to make ropes which can be used in weaving bundles of roof thatching, the tannin in the bark can be used to tan leather. The leaves of mopane are a source of food for game and livestock. The mopane worms (*Imbrasia belina*) which also feed on mopane leaves are delicacy to many local people. *Catophractes alexandrii* is the source of food to the livestock and game in the area. According to Mannheimer, C. A. & Curtis, B. A. (2009), the leaves of *Catophractes alexandrii* are edible by livestock and game, and the rigid branches of this plant species can be used by the San people to ignite fire. *Dichrostachys cinerea* on the other hand had the leaves which can be a source of food to livestock and game in the area. According to Mannheimer, C. A. & Curtis, B. A. (2009), *Combretum apiculatum*. subsp. *apiculatum* had two species in Namibia which can be differentiated by their leaves. The fresh and dry leaves of the plant are the source of food to livestock and the bark from these plants can be used in tanning leather. This species is considered to have some medicinal value; the residue produced from the crushed leaves can make a powder which can be smeared on the umbilical cord

of newborn baby. A decoction of the leaves can be utilized as a remedy for stomach disorders. Kunene region is one of the regions with a high species diversity of *Commiphora* species, this plant species has distinct utilization. According to Mannheimer, C. A. & Curtis, B. A. (2009), *Commiphora mollis* leaves are sources food for wild animals and livestock. The household articles can be crafted from the wood of this species. *Terminalia prunioides* which is common in the area, its bark can be crushed and boiled in water and administered after cooling to treat cough. The sap of this species can also be chewed as a remedy for cough, sore throats, and stomach cramps. Due to its sturdy wood various handle for tools, knobkieries can be made from it and it is a good source of firewood. The main entrances of the kraals are strengthened by forked branches made from these trees. This plant is also vital in this community for ritual purposes such as during ritualistic purifying events (Mannheimer, C. A. & Curtis, B. A. 2009). The bark of *Sterculia africana* can be taken to relieve cramps during post-delivery and is a good remedy for stomach problems. *Boscia albitrunca* are some of the common plant species in the proposed area. According to Mannheimer, C. A. & Curtis, B. A. (2009), *Boscia albitrunca* has a wide distribution in Namibia and this plant species is adaptable to numerous habitats. This species had a myriad of uses and it is a vital component of the vegetation in the area. This species is a source of food to livestock and game, and it is considered to be highly nutritious. Although these species are considered to be a least concern, it is protected under the forest act; act 12 of 2001, hence a permit will be required from the Ministry of Agriculture, Water and Forestry, Directorate of Forestry to remove any protected species in the area during operation. The Ministry of Environment, Forestry and Tourism (MEFT) should also be approached for the permit to remove any protected species.

**Table 4:** Plant species encountered during the botanical assessment of the area augmented with plants from the Herbarium database in Windhoek (BRAHMS)

Species	Occurrences	Protection Status	Conservation Categories
<i>Colophospermum mopane</i>	Abundant	LC	-
<i>Catophractes alexandrii</i>	Abundant	LC	-
<i>Dichrostachys cinerea</i>	Abundant	LC	-
<i>Combretum apiculatum. subsp. apiculatum</i>	Abundant	-	-
<i>Commiphora mollis</i>	Abundant		-
<i>Terminalia prunioides</i>	Abundant	-	-
<i>Sterculia africana</i>	Common	-	F
<i>Acacia senegal. var. rostrata</i>	Common	-	-

<i>Acacia sieberiana. var. woodii</i>	Common	-	-
<i>Boscia albitrunca</i>	Common		F
<i>Acacia senegal. var. rostrata</i>	Common		-
<i>Adenium boehmianum</i>	Common	-	-
<i>Aloe littoralis</i>	Occasional	-	-
<i>Acacia erubescens</i>	Common	-	-
<i>Bauhinia petersiana subsp. Macrantha</i>	Occasional	-	-
<i>Boscia microphylla</i>	Occasional	-	-
<i>Combretum imberbe</i>	Common	-	-
<i>Commiphora oblanceolata</i>	Occasional	-	-
<i>Euphorbia guerichiana</i>	Occasional	-	-
<i>Barleria elegans</i>	Occasional	-	-
<i>Barleria mackenii</i>	Common	-	-
<i>Commiphora glaucescens</i>	Common	LC	NE
<i>Commiphora tenuipetiolata</i>	Common	LC	-
<i>Commiphora virgata</i>	Common	LC	-
<i>Berchemia discolor</i>	Not common	-	-
<i>Cenchrus ciliaris</i>	Common	-	-
<i>Ceraria longipedunculata</i>	Common	LC	E
<i>Chlorophytum galpinii</i>	Occasional	-	-
<i>Chrysopogon nigritanus</i>	Common	LC	-
<i>Cleome foliosa</i>	Occasional	-	-
<i>Cleome gynandra</i>	Common	-	-
<i>Cleome laburnifolia</i>	Common	-	E

<i>Cocculus hirsutus</i>	Occasional	-	-
<i>Croton gratissimus var. gratissimus</i>	Occasional	-	-
<i>Diospyros mespiliformis</i>	Occasional	-	-
<i>Diospyros virgata</i>	Occasional	LC	-
<i>Eragrostis lehmanniana Nees var. lehmanniana</i>	Occasional	-	-
<i>Euclea divinorum</i>	Occasional	-	-
<i>Euphorbia monteiri subsp. monteiri</i>	Common	LC	NE
<i>Grewia schinzii</i>	Common	-	-
<i>Heliotropium zeylanicum</i>	Occasional	-	-
<i>Hibiscus rhabdotospermus</i>	Common	-	-
<i>Hiernia angolensi</i>	Common	LC	-
<i>Indigofera astragalina</i>	Common	LC	-
<i>Indigofera flavicans</i>	Common	LC	-
<i>Ozoroa crassinervia</i>	Occasional	-	-
<i>Sporobolus fimbriatus</i>	Occasional	LC	-
<i>Vangueria infausta subsp. infausta</i>	Occasional	-	-
<i>Ximenia americana L. var. americana</i>	Common	LC	-

**KEY:** LC – least concern; E- Endemic; NE- Near - Endemic; F – Forestry protected under Forestry Act (act 12 of 2001).

#### 3.2.5.1 Alien Plants Assessments

The alien plants were taken into consideration during the botanical assessment. It was found that there were no records or observation of alien plants in the area envisaged for the establishment and mining of dimension stones.

### 3.3 CONCLUSION AND RECOMMENDATION

The vegetation in the surrounding area of the mining claim 69151 ear-marked for the establishment and mining of dimension stones, at Oroutumba Village, Swartbooisdrift, have a high species diversity however, most of the plant species in the surrounding area are least concern due to their wide distribution around the country. The impact of the project on vegetation in the area can be rated moderate and localized since the area ear-marked for the mining of dimension stone is already disturbed now. The concern with regards to vegetation is the possible chopping down of protected plant species, endemic and near endemic, although they are least concern, their ecological value should not be under rated at all costs. To mitigate this impact a replacement approach should be taken into consideration by planting more of the chopped down trees in the vicinity. Where possible the areas with a high concentration of protected, endemic, and near-endemic plant species should be avoided. Local nurseries in Kunene region and beyond such as Ministry of Agriculture, Water and Forestry, Directorate of Forestry nursery in Opuwo and Outapi in Omusati Region should be approached for the acquisition of indigenous trees for replacement purposes. A plant specialist/botanist should be hired to ensure that the replacement and rehabilitation programs are carried out during the decommissioning.

### 3.4 FAUNA

#### 3.4.1.1 Birds observed in the area.

The birds were observed or encountered in the area during the site visit, and this was augmented with the use of Kenneth Newman, 2000. Newmans Birds By colour, Southern Africa Common Birds. Arranged by Colour, Struik New Holland Publishing (Pty) Ltd 2000. Since birds have no transboundaries this list does not restrict the occurrence of other birds not appearing in the list below:

- Laughing Dove
- Red –Eyed Bulbul
- Black Chested Prinia
- Grey – Backed Finchlark
- Helmeted quinea fowls
- Social Weaver
- Mouse bird
- Monteiro Hornbill
- Namaqua Dove
- Namaqua Sandgrouse
- Southern Yellow Billed Hornbill
- Streaky – Headed Canary
- Yellow Canary

In Oroutumba Village several wildlife species have been observed free roaming and grazing such as zebras and duikers. A few snake species such as cobras and puff adders have also been reported to be encountered by the locals and the workers on the mining claim.

## 4 PROJECT DESCRIPTION

### 4.1 PROJECT COMPONENTS

As previously outlined in Section 1.1, the proposed project involves conducting an EA for the establishment and mining of dimension stones on mining claim 69151 at Oroutumba Village, Swartbooisdrift, Kunene Region

### 4.2 DIMENSION STONE MINING

The dimension stone mining activities entail the cutting of dimension stone by making use of automated diamond wire cutting machines. The stones will be cut as per the dimensions that have been preloaded into the machine and thereafter these stones are loaded with a heavy-duty front-end forklift into a flatbed truck which transport the dimension stones to Walvis Bay port for export to China. The proponent is in possession of mining claim rights from the Ministry of Mines and Energy enabling them to mine the dimension stones from the allocated portions on the Zebra Mountains.

The proposed development provides employment for 10 people who are involved in the mining, cutting & on/off-loading of the stones, using the heavy-duty machinery shown below and contributes to the local economy of the Swartbooisdrift area. The intended Environmental Assessment is needed to assess the potential social and environmental impacts associated with the intended dimension stone mining activities and also to provide methods of rehabilitation of the quarries once the dimension stones have been excavated.



**Figure 7:** The machinery to be used for dimension stone mining activities (HEEC, 2023).





**Figure 8:** Dimension stones will be cut using an automated diamond wire machine to produce the cubes for export (HEEC, 2023)

The site photo A (**Figure 8**) above indicates the depth of the quarry left behind after the dimension stones have been excavated at the mining claim site during the exploration phase. The main soil type in the area is arenosol, which is a soil type consisting mainly of sand, with little humus or clay, found typically in deserts and arid tropical regions. Efforts of rehabilitation in terms of the provided Environmental Management Plan has to be made to ensure that the ground attains the surrounding topography of contour levels after the activities cease thus reducing these negative impacts.

The proponent is in possession of valid mining claim 69151 rights from the Ministry of Mines & Energy enabling them to excavate the natural dimension stones from the allocated portions and efforts will be made to refill these quarries once they are no longer in use and the land can be reclaimed for other purposes, such as livestock farming as detailed in the environmental management plan (**Annexure G**).

#### **4.3 ALTERNATIVES**

As pointed out in Section 1.4 above various mining claim alternatives were initially considered by the proponent, ultimately resulting in the final development of the most financially viable claim.

##### **4.3.1 No – Go Alternative**

The no-go alternative is the baseline against which all alternatives are assessed. The no-go alternative would essentially entail maintaining the current situation, whereby the dimension stone mining activities will go on without an Environmental Management Plan in place thus increasing the harmful impacts on the environment. Additionally, the dimension stone mining activities may cease to take place which would have a negative social impact as the Oroutumba Village would forfeit the economic benefits associated with the development. In addition, if the intended development does not commence, the residents will also not be able to benefit from the employment opportunities created from the mining activities.

#### **4.4 SURROUNDING LAND USE**

The mining claim 69151 is located in a mountainous range quite a distance from any human settlements so the immediate surrounding land is made up of considerable tracts of land endowed with desert vegetation typical of the Zebra mountain.

#### **4.5 ENGINEERING SERVICES**

The mining claim is located about 6 km by dirt road from the Oroutumba Village and there is a borehole that was drilled for the provision of water however electricity on the site is not

connected to the national grid via the regional electricity distributor as yet and use is made of diesel & solar power. The cellphone network is quite weak in the area, however a booster satellite has been mounted on site to improve connectivity and communications, see **Figure 9** below.



**Figure 9:** Mobile phone network booster on site (HEEC, 2023)

Sewage is to be removed from the site toilets (**Figure 11**) by means of sewer removal/honey sucker vehicle at regular intervals for disposal at the Opuwo sewerage/oxidation ponds or alternatively a modern septic tank unit must be installed on the site to handle the sewerage such as the ECO Smart Integrated Fixed Film Activated Sludge and Moving Bed Biological Reactors Waste Water Treatment System, which is a self-contained sewage treatment system that utilises a combination of anaerobic as well as aerobic biological processes, combined with an absorption filtration system to treat wastewater generated on-site.



**Figure 10:** The current makeshift sewerage treatment system which needs to be upgraded to modern standards (HEEC, 2023).

The wastewater treatment system to be implemented comprises a six-stage wastewater treatment system operating much like a small municipal sewage treatment plant, resulting in a clean, septic effluent. The system also has a modular design and the treatment capacity can be adapted to treat a wide range of operating requirements.

This system is designed to handle a continuous flow of wastewater by relying on bacteria suspended in the sewage to break down solids, as well as employing the absorption filtration technology to remove other contaminants. The process includes anaerobic, 1st anoxic, 1st aerobic, 2nd anoxic and 2nd aerobic (MBBR) reactors in series with 2nd stage aerobic mixed liquor recycle to the 1st stage anoxic reactor, 1st stage anoxic reactor sludge recycle as well as return sludge recycle from both clarifiers to the anaerobic reactor. Importantly, the ECO Smart Integrated Fixed Film Activated Sludge and Moving Bed Biological Reactors Waste Water Treatment System operate on gravity and no feed pumps are therefore required. The suspension and aeration are supported by an aeration pump that supplies air to the bio-filtration process, the aerobic bacteria generator chamber, and the aeration chamber, thus providing a constant stirring of the wastewater in addition to the oxygenation.

This Recycle Sanitation System, is suitable for all areas off grid i.e., with no sewer and/or electricity services available, and this design has been adapted to include an aerated biological filter as well as a cistern inline absorption filter to ensure that high-quality effluent is supplied to the toilet cistern.

## 5 PUBLIC PARTICIPATION PROCESS

### 5.1 PUBLIC PARTICIPATION REQUIREMENTS

In terms of Section 21 of the EIA Regulations a call for open consultation with all I&APs at defined stages of the EIA process is required. This entails participatory consultation with members of the public by providing an opportunity to comment on the proposed project. Public Participation has thus incorporated the requirements of Namibia's legislation, but also takes account of international guidelines, including Southern African Development Community (SADC) guidelines and the Namibian EIA Regulations. Public participation in this project has been undertaken to meet the specific requirements in accordance with the international best practice. Please see **Table 5** below for the activities undertaken as part of the public participation process. The public was given time to comment from **14 April to 5 May 2023**.

**Table 5: Table of Public Participation Activities**

ACTIVITY	REMARKS
Placement of site notices/posters in Oroutumba Village	See <b>Annexure A</b>
Placing advertisements in two newspapers namely the Windhoek Observer & Confidante	See <b>Annexure B</b>
Written Background Information Document for interested Oroutumba Residents	See <b>Annexure D</b>

#### 5.1.1 Environmental Assessment Phase 2

The second phase of the PPP involved the lodging of the Final Environmental Scoping Report (DESR) on the eia online portal to allow for public review and comments. I&APs had 21 days to submit comments or raise any issues or concerns they may have with regard to the proposed project.

*The purpose of this chapter is to describe the assessment methodology utilized in determining the significance of the management, location, and operational impacts of the dimension stone mining, and where applicable the possible alternatives, on the biophysical and socio-economic environment.*

Assessment of predicted significance of impacts for dimension stone mining activities that are already operational is by its nature, inherently uncertain – environmental assessment is thus an imprecise science. To deal with such uncertainty in a comparable manner, a standardised and internationally recognised methodology has been developed. Such accepted methodology is applied in this study to assess the significance of the potential environmental impacts of the proposed development, outlined as follows in **Table 6**.

**Table 6:** Impact Assessment Criteria

CRITERIA	CATEGORY
<b>Impact</b>	<b>Description of the expected impact</b>
<b>Nature</b> Describe type of effect	<p><b>Positive:</b> The activity will have a social / economical / environmental benefit.</p> <p><b>Neutral:</b> The activity will have no effect</p> <p><b>Negative:</b> The activity will have a social / economical / environmental harmful effect</p>
<b>Extent</b> Describe the scale of the impact	<p><b>Site Specific:</b> Expanding only as far as the activity itself (onsite)</p> <p><b>Small:</b> restricted to the site's immediate environment within 1 km of the site (limited)</p> <p><b>Medium:</b> Within 5 km of the site (local)</p> <p><b>Large:</b> Beyond 5 km of the site (regional)</p>
<b>Duration</b> Predicts the lifetime of the impact.	<p><b>Temporary:</b> &lt; 1 year (not including construction)</p> <p><b>Short-term:</b> 1 – 5 years</p> <p><b>Medium term:</b> 5 – 15 years</p> <p><b>Long-term:</b> &gt;15 years (Impact will stop after the operational or running life of the activity, either due to natural course or by human interference)</p> <p><b>Permanent:</b> Impact will be where mitigation or moderation by natural course or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary</p>

<p><b>Intensity</b> Describe the magnitude (scale/size) of the Impact</p>	<p><b>Zero:</b> Social and/or natural functions and/ or processes remain unaltered  <b>Very low:</b> Affects the environment in such a way that natural and/or social functions/processes are not affected  <b>Low:</b> Natural and/or social functions/processes are slightly altered  <b>Medium:</b> Natural and/or social functions/processes are notably altered in a modified way  <b>High:</b> Natural and/or social functions/processes are severely altered and may temporarily or permanently cease</p>
<p><b>Probability of occurrence</b> Describe the probability of the Impact <u>actually</u> occurring</p>	<p><b>Improbable:</b> Not at all likely  <b>Probable:</b> Distinctive possibility  <b>Highly probable:</b> Most likely to happen  <b>Definite:</b> Impact will occur regardless of any prevention measures</p>
<p><b>Degree of Confidence in predictions</b> State the degree of confidence in predictions based on availability of information and specialist knowledge</p>	<p><b>Unsure/Low:</b> Little confidence regarding information available (&lt;40%)  <b>Probable/Med:</b> Moderate confidence regarding information available (40-80%)  <b>Definite/High:</b> Great confidence regarding information available (&gt;80%)</p>
<p><b>Significance Rating</b> The impact on each component is determined by a combination of the above criteria.</p>	<p><b>Neutral:</b> A potential concern which was found to have no impact when evaluated  <b>Very low:</b> Impacts will be site specific and temporary with no mitigation necessary.  <b>Low:</b> The impacts will have a minor influence on the proposed development and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures  <b>Medium:</b> Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures.  <b>High:</b> Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.</p>

\*NOTE: Where applicable, the magnitude of the impact has to be related to the relevant standard (threshold value specified and source referenced). The magnitude of impact is based on specialist knowledge of that particular field.

For each impact, the EXTENT (spatial scale), MAGNITUDE (size or degree scale) and DURATION (time scale) are described. These criteria are used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The decision as to which combination of alternatives and mitigation measures to apply lies with Mr. Hosea Kazepurua as the proponent, and their acceptance and approval ultimately with the relevant environmental authority.

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e. the character and identity of the receptor of the impact.

#### 6.1 MITIGATION MEASURES

There is a mitigation hierarchy of actions which can be undertaken to respond to any proposed project or activity (See **Figure 11** below). These cover avoidance, minimization, restoration and compensation. It is possible and considered sought after to enhance the environment by ensuring that positive gains are included in the proposed activity or project. If negative impacts occur then the hierarchy indicates further steps.





Figure 11: Mitigation Hierarchy

**Impact avoidance:** This step is most effective when applied at an early stage of project planning. It can be achieved by:

- not undertaking certain projects or elements that could result in adverse impacts;
- avoiding areas that are environmentally sensitive; and
- putting in place preventative measures to stop adverse impacts from occurring.

**Impact minimization:** This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

- scaling down or relocating the proposal;
- redesigning elements of the project; and
- taking supplementary measures to manage the impacts.

**Restoration:** This step is taken to improve degraded or removed ecosystems following exposure to impacts that cannot be completely avoided or minimised. Restoration tries to return an area to the original ecosystem that occurred before impacts. Restoration is frequently needed towards the end of a project's life-cycle, but may be possible in some areas during operation.

**Impact compensation:** This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:

- **rehabilitation** of the affected site or environment, for example, by habitat enhancement;
- **restoration** of the affected site or environment to its previous state or better; and
- **replacement** of the same resource values at another location (off-set), for example, by wetland engineering to provide an equivalent area to that lost to drainage or infill.
- **offsets** are often complex and expensive; it is therefore preferable to pay attention to earlier steps in the mitigation hierarchy.

### 7.1 INTRODUCTION

This Chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the operational activities described in Chapter 4. These include potential impacts, which may arise during the operation of the dimension stone mining (i.e., long-term impacts) as well as the potential related impacts (i.e. short to medium term) during the internal road construction to access the dimension stones with ease on the quarry. The assessment of potential impacts will help to inform and provide a clear picture to MEFT: DEA regarding the management of environmental aspects considered. In turn, MEFT: DEA's decision on the environmental acceptability of the operation of the dimension stone mining activities in the Oroutumba Village, Swartbooisdrift area and the setting of conditions of authorisation (should the operation be authorised) will be informed by this chapter, amongst other information contained in this EA Report.

The baseline and potential impacts that could result from the continued operation of the existing dimension stone mining activities are described and assessed with potential mitigation measures recommended. Finally, comment is provided on the potential cumulative impacts which could result should this mining operation be approved.

### 7.2 IMPACTS DURING DIMENSION STONE MINING

During the dimension stone mining phase a considerable area of land in the mountain has changed to make way for the mining/quarrying operations in the subject area.

#### 7.2.1 Surface and Ground Water Impacts

The risk of polluting water resources may be created if excavations are not covered after dimension stone mining has ceased. Open pits which become filled with water from rain may become contaminated or polluted which may seep into the underground water table thus polluting it. Otherwise, these standing water bodies can be death traps for both humans and animals that may fall and drown in the uncovered quarries. These may also be breeding grounds for waterborne disease vectors such as the malaria larvae or if the contaminated water (by human/livestock fecal matter) is used for consumption it can spread waterborne diseases such as cholera/dysentery to the immediate communities.

#### 7.2.2 Visual and Sense of Place Impacts

The creation of large open quarries results when dimension stones are mined in an area. This often leaves the landscape in a visually unpleasant state/compromised aesthetic state. There is thus very likely to be a change in visual characteristics of the site due to the fact that the site will now have a

different landscape due to the dimension stones being excavated. Piles of sand and trenches where dimension stones have been excavated will result. The extent of this disturbance will depend on how highly the interested and affected parties valued the initial aesthetic quality of the site.

### **7.2.3 Noise Impacts**

The operation of various types of machinery utilised during dimension stone mining activities will result in associated noise impacts of normally more than the recommended 85dB exposure to employees during working hours for extended periods, therefore employees are to be provided for with ear protecting gear and given sufficient breaks to protect their hearing ability. The loading and off-loading of dimension stones onto the flatbed trucks and operation of machinery such as the heavy duty forklift, excavator, grader and air compressor may result in associated noise being generated.

### **7.2.4 Dust and Emission Impacts**

The air quality in the area is considered to be fairly good within the mining claim area. Dust may result during the dimension stone mining activities when the excavations are dug out with the automatic diamond wire stone cutting machinery. Additional dust and emissions associated with the dimension stone mining activities will mostly be generated by vehicle movement of the excavator and heavy duty fork lift to and from the dimension stone cutting areas on the mining claim. The entire activity needs to be controlled and managed as required by the **Public Health Act of 2015** and **Atmospheric Pollution Prevention Ordinance (No. 11 of 1976)**.

### **7.2.5 Impacts on biodiversity**

The mining claim site has not been disturbed much by human activity from the excavation of dimension stone since MC 69151 lies on the Zebra Mountain range and thus has been left in its natural environmental state. However, at the claim the removal of sand and dimension stone thus ultimately has resulted in the limited removal of vegetation in the subject mining claim areas. This in turn also has had an impact on the habitats of the fauna located within the subject areas. Particularly for birds as the dimension stone mining operations may result in ecological effects on bird nesting.

Quarries that are left open become hazardous sites for animals that frequent the area, especially during the good rainy seasons when these can become filled with water in which they can drown. Thus there is need to erect a perimeter fence around the active quarries to avoid such risks. Hence it is very necessary for the quarries to be refilled once excavation has ceased at this particular mining claim site.

### **7.2.6 Heritage impacts**

There are no declared heritage sites by the National Heritage Council of Namibia on the subject site. An accidental find procedure should however be provided for.

### **7.2.7 Impacts of Flooding**

Flooding may occur as a result of water accumulating in the quarries after heavy rains in a good season. Thus, it is essential to ensure that the trenches are refilled with soil and rubble after excavation has occurred as the open pits/quarries pose a threat to animals and humans in terms of health and safety. Rainwater in the area also triggers serious erosion problems in the mountainous areas and some sediment deposits were observed to have run down the mountain slopes to the base.

### **7.2.8 Social Impacts**

Unemployment is widely experienced across the country including in the Opuwo district. There is an increased demand for job opportunities due to the rapid population growth. The dimension stone mining activities contributes towards addressing this need, by providing employment to the local people in the area. In total Mr. Hosea Kazepurua will employ about 10 people on either permanent or casual basis for the mining operations. Additionally mining dimension stones produce stone offcuts which can be used as affordable building materials by the local people and thus they can construct decent houses with strong and solid walls in comparison to the option of using corrugated iron sheets or mud and poles. The intended activity also contributes towards the national economy and thereby attracts more investors into the country.

## **7.3 IMPACTS DURING TRANSPORTATION OF DIMENSION STONES**

### **7.3.1 Traffic Impacts**

Traffic is not expected to increase significantly during the dimension stone mining activities however it may be slightly impacted due to the types of vehicles (i.e., heavy duty trucks) being utilised for the transportation of the dimension stones to the port of Walvis Bay for export. However, if the excavation and transportation is done according to a schedule and the vehicles strictly abide to using the demarcated right of ways the impact is expected to be of very low significance as the loads are done on a scheduled basis which do not conflict with peak periods.

### **7.3.2 Existing Service Infrastructure Impacts**

The subject area intended for the associated dimension stone mining activities is remote and therefore is currently provided for with underground borehole water drilled near the mining claim 69151 and a diesel generator for electricity.

### **7.3.3 Surface and Ground Water Impacts**

The ephemeral river in the catchment area rarely flows because of the erratic rainfall patterns in the Oroutumba Village, Swaartbooisdrift area. Surface and ground water impacts may be encountered during the excavation phase, especially if activities take place within the rainy season. The risk of contaminating such water sources can be increased by accidental spillage of oils and fuels and any other equipment used during quarrying operations. This risk is minimised by the assimilative capacity of water, erratic rainfall patterns and the fact that the water table at Oroutumba Village is low with the aquifer at about 100m deep where the borehole water is sourced.

### **7.3.4 Health, Safety and Security Impacts**

Due to a relatively high demand of employment during the dimension stone mining activities, this may involve the establishment of a temporary workforce at the village in Oroutumba Village. Experience with other projects in a developing-world context has shown that, where migrant workers have the opportunity to interact with the local community, a significant risk is created for the development of social conditions and sexual behaviors that contribute to the spread of HIV and AIDS.

In response to the threat the pandemic poses, MEFT has developed a policy on HIV and AIDS. This policy, which was developed with support from USAID, GTZ and the German Development Fund, provides for a non-discriminatory work environment and for workplace programs managed by a Ministry-wide committee. The MEFT has also recently initiated a programme aimed at mainstreaming HIV and gender issues into environmental impact assessments.

In addition the workers should be provided for with Protective Personal Equipment such as overalls, hard boots, gloves, goggles, dust masks and sun hats to be protected from the weather elements and associated work hazards. A fully stocked first aid kit with unexpired medicines must always be on site.

### **7.3.5 Noise Impacts**

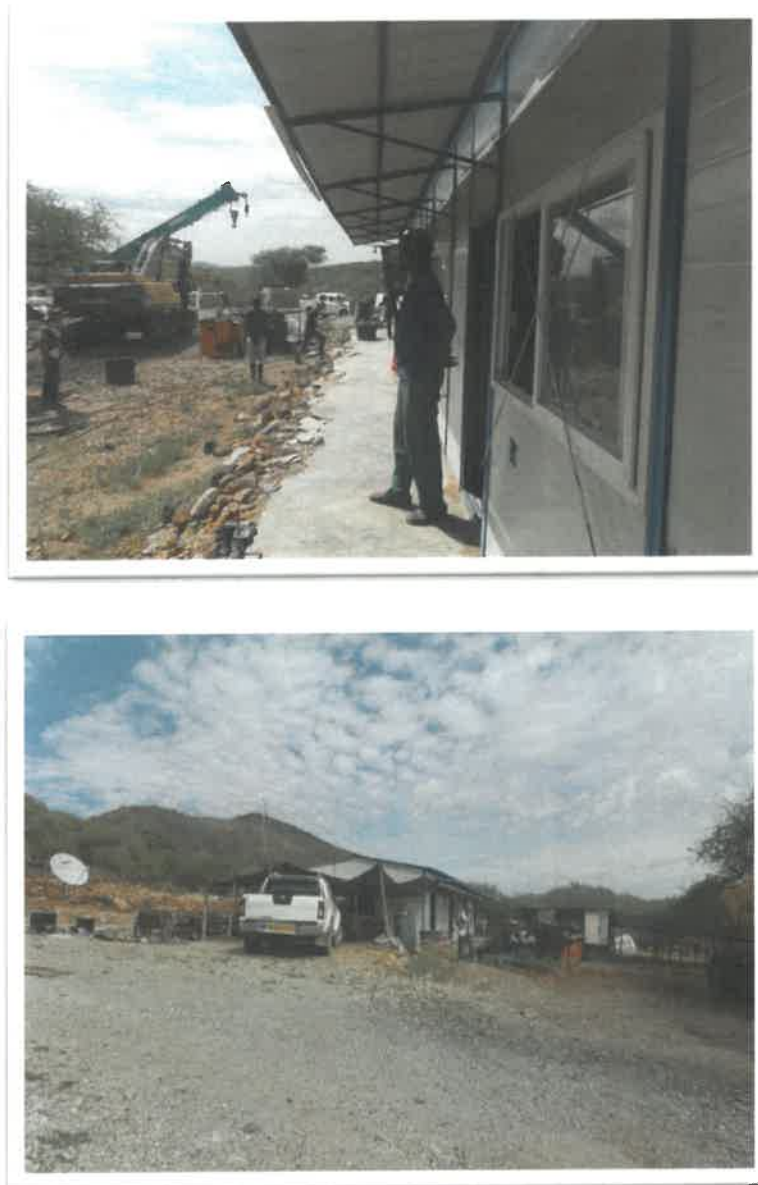
The dimension stone mining activities may result in associated noise impacts. These noise impacts will mainly be associated with use of the automatic diamond wire dimension stone cutting machine, excavators, graders and noise from the heavy duty forklift transporting the stones to the nearby (<1 km) loading site. The residents of the nearby Oroutumba Village and adjacent settlements/farms and those that frequent the existing area will be impacted however only minimally as the mining claim is located at a distance from any human settlements within the boundaries of Oroutumba Village. The impact is very low and is limited to the excavation period only that utilises heavy duty tools.

### 7.3.6 Municipal Service Impacts

The dimension stone mining activities will result in additional people on-site, who will require provision of the following services:

- Potable water for domestic (ablution and drinking) purposes.
- Temporary toilets during the mining operations.
- Solid waste management (domestic waste).

Some of the workers are housed on site and are provided with the basic amenities to sustain their livelihoods to a minimal standard as is evidenced by the prefabricated material housing and associated infrastructure in **Figure 12** below. However, because the mining operations are in its infancy the proponent has currently asked the Headman to identify a suitable land parcel in Oroutumba Village to move the houses for the employees and provide them with a renewable source of energy in the form of solar panels to alleviate their standard of living.



**Figure 9:** Miners' prefabricated housing facilities (HEEC, 2023)

### **7.3.7 Storage and Utilisation of Hazardous Substances**

Hazardous substances are regarded by the Hazardous Substance Ordinance (No. 14 of 1974) as those substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances. It covers manufacture, sale, use, disposal and dumping as well as import and export. During the mining operations, the use; storage and disposal of these types of hazardous substances, such as shutter oil, curing compounds, types of solvents, primers and

adhesives and diesel, on-site could have negative impacts on the surrounding environment, if these substances spill and enter the environment, as shown in **Figure 13** below, these should therefore be put in a lockable bunded storeroom.



**Figure 13:** Hydrocarbons that need to be stored in a lockable bunded storeroom (HEEC, 2023)

#### 7.4 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan (EMP) is contained in **Annexure G** of this report. The purpose of the EMP is to outline the type and range of mitigation measures that should be implemented during the dimension stone mining activities and decommissioning phases of the project to ensure that negative impacts associated with the dimension stone mining are avoided or mitigated.

#### 7.5 CUMULATIVE IMPACTS

The cumulative impact of the mining operations of dimension stone are not yet known and therefore are very difficult to rate. If all proposed mitigation measures and suggestions brought forward are however in place to minimise the overall impacts then the cumulative impact can be expected to be rated as **Medium-Low (negative)** for the operation and management of the mining activities.

#### 7.6 SUMMARY OF POTENTIAL IMPACTS

A summary of the significance of the potential impacts from the dimension stone mining activities assessed above is included in **Table 7**. The **Tables 8 – 9** provide a summary of the mitigation measures proposed for the impacts. While some difference in magnitude of the potential impacts would result from the proposed alternatives this difference was not considered to be significant for any of the potential impacts. As such, the table below applies to all proposed alternatives.



**Table 7: Summary of the significance of the potential impacts**

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
<b>DIMENSION STONE MINING IMPACTS</b>										
<b>1. Surface and Ground Water Impacts</b>	Dimension stone mining activities	No mitigation	Local	Very-High	Medium term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Medium-Low	Medium term	Medium-Low	Probable	Certain	Reversible	Medium-Low
		No mitigation	Local	Low	Medium term	Neutral	Probable	Certain	Reversible	Neutral
	No go	Mitigation	Local	Low	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>2. Visual Sense of Place Impacts</b>	Dimension stone mining activities	No mitigation	Local	Medium-Low	Medium term	Medium	Probable	Certain	Reversible	Medium-Low (-ve)
		Mitigation	Local	Low	Medium term	Medium-Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>3. Noise Impacts</b>	Dimension stone mining activities	No mitigation	Local	Medium-Low	Medium term	Medium-Low	Probable	Certain	Reversible	Medium-Low (-ve)
		Mitigation	Local	Low	Medium term	Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
<b>4. Dust and Emission Impacts</b>		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
	Dimension stone mining activities	No mitigation	Local	Medium-Low	Short term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Low	Short term	Medium-Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>5. Biodiversity (Fauna and Flora)</b>	Dimension stone mining activities	No mitigation	Local	Low	Short term	High	Probable	Certain	Reversible	Low (-ve)
		Mitigation	Local	Very low	Short term	Medium-Low	Probable	Certain	Reversible	Very low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>6. Heritage Impacts</b>	Dimension stone mining activities	No mitigation	Local	Medium	Short term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Low	Short term	Low	Probable	Certain	Reversible	Medium - Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
<b>7. Impacts of Flooding</b>	Dimension stone mining activities	No mitigation	Local	Medium	Short term	Medium	Probable	Certain	Reversible	Medium - low (-ve)
		Mitigation	Local	Low	Short term	Medium-Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>8. Social Impacts</b>	Dimension stone mining activities	No mitigation	Local	Very low	Short term	High++	Probable	Certain	Irreversible	Very low (-ve)
		Mitigation	Local	Negligible	Short term	High++	Probable	Certain	Irreversible	Negligible (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
<b>TRANSPORTATION IMPACTS</b>										
<b>1. Traffic Impacts</b>	Dimension stone mining activities	No mitigation	Local	Medium-Low	Short term	Low	Probable	Certain	Reversible	Medium-Low (-ve)
		Mitigation	Local	Low	Short term	Very Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
2. Existing Service Infrastructure Impacts	Dimension stone mining activities	No mitigation	Local	Low	Short term	Low	Probable	Certain	Reversible	Low (-ve)
	Mitigation	Mitigation	Local	Very low	Short term	Very low	Probable	Certain	Reversible	Very low
3. Surface and Ground Water Impacts	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
	Mitigation	Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
	Dimension stone mining activities	No mitigation	Local	Medium	Short term	Medium - low	Probable	Certain	Reversible	Medium - Low (-ve)
	Mitigation	Mitigation	Local	Low	Short term	Low	Probable	Certain	Reversible	Very low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
	Mitigation	Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
4. Health, Safety and Security Impacts	Dimension stone mining activities	No mitigation	Local	Medium	Short term	Medium	Probable	Certain	Reversible	Medium - Low (-ve)
	Mitigation	Mitigation	Local	Low	Short term	Medium-Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
	Mitigation	Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
5. Noise Impacts	Dimension stone	No mitigation	Local	Medium	Medium term	Medium	Probable	Certain	Reversible	Medium (-ve)
	Mitigation	Mitigation	Local	Medium	Medium term	Medium	Probable	Certain	Reversible	Medium (-ve)

Description of potential impact	Project alternative	No mitigation / mitigation	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Confidence	Reversibility	Cumulative impact
	mining activities	Mitigation	Local	Low	Medium term	Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>6. Municipal Service</b>	Dimension stone mining activities	No mitigation	Local	Medium	Medium term	Medium	Probable	Certain	Reversible	Medium (-ve)
		Mitigation	Local	Low	Medium term	Low	Probable	Certain	Reversible	Low (-ve)
	No go	No mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Medium term	Neutral	Probable	Certain	Reversible	Neutral
<b>7. Storage and Utilisation of Hazardous Substances</b>	Dimension stone mining activities	No mitigation	Local	Low	Short term	Medium	Probable	Certain	Reversible	Low (-ve)
		Mitigation	Local	Very low	Short term	Low	Probable	Certain	Reversible	Very low (-ve)
	No go	No mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral
		Mitigation	Local	Neutral	Short term	Neutral	Probable	Certain	Reversible	Neutral

**Table 8:** Proposed mitigation measures for the dimension stone mining activities

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
Surface and Ground Water-Storm water and Erosion Control	<ul style="list-style-type: none"> <li>● Ensure that surface water accumulating on-site are channelled and captured through a proper storm drainage trench.</li> <li>● Disposal of waste at the mining claim site should be regulated and properly managed.</li> <li>● Regular preventative maintenance should be carried out on the quarry infrastructure. Earth embankments to prevent erosion will be established where appropriate.</li> <li>● The surface water accumulated in the open trenches must be channelled along the natural tributaries of area.</li> <li>● It is recommended that dimension stone mining takes place outside of the rainy season in order to limit flooding on site and surface water pollution.</li> <li>● Storm water Management Plans should be developed for each quarry on mining claim 69151 and should include the management of storm water during excavation, as well as the installation of storm water and erosion control infrastructure and management thereof after completion of mining.</li> <li>● Storm water management systems will be installed to prevent storm water from entering or exiting the quarry, which could result in silt laden surface water from draining into any ephemeral river systems that may be in proximity to the mining claim site.</li> <li>● Quarry slopes should be profiled to ensure that they are not subjected to excessive erosion but capable of drainage run-off with minimum risk of scour (maximum 1:3 gradient).</li> <li>● If necessary, diversion channels should be constructed ahead of the open cuts as well as above emplacement areas and stockpiles to intercept clean run-off and divert it around disturbed areas into the natural drainage system downstream of the quarry.</li> <li>● All existing mined areas (where works will take place) will be rehabilitated to control erosion and sedimentation.</li> </ul>

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
Soil Aspects	<ul style="list-style-type: none"> <li>● Existing vegetation must be retained as far as possible to minimise erosion problems.</li> <li>● Rehabilitation of quarries shall be planned and completed on a continuous basis in such a way that the run-off water (if any) will not cause erosion.</li> <li>● Visual inspections shall be done on a regular basis with regard to the stability of water control structures, erosion and siltation (if required).</li> <li>● Topsoil shall be removed from all areas where physical disturbance of the surface will occur, prior to the disturbance occurring. Topsoil refers to that layer of soil covering the earth and which provides a suitable environment for the germination of seeds, allows the penetration of water, and is a source of micro-organisms, plant nutrients and in some cases seed.</li> <li>● The topsoil shall be stored so that it can be placed on the exposed subsoil as soon as the mining of the excavation or the relevant section of it has been completed and its slopes have been finished off to the acceptable gradient as part of the rehabilitation process.</li> <li>● Topsoil shall be stockpiled only in the areas dedicated for only that purpose, even if the topsoil is only partially cleared.</li> <li>● The topsoil removed, shall be stored in a bund wall on the high ground side of the quarry and in such a way that it will not cause damming up of water or washaways, or wash / blow away itself. Stockpiles will not exceed a height of <b>two</b> meters.</li> <li>● Stockpiles shall be managed so as to maintain the regrowth potential of the topsoil. Should the stockpiles stand for too long (greater than 12 months) it can be considered barren from a seed bank point of view. In this case reseedling may be required. Stockpiles should ideally be stored for no longer than six months.</li> <li>● The overburden, i.e., that layer of soil immediately beneath the topsoil, will be removed and stored separately from the topsoil.</li> <li>● No chemical pollution shall be allowed to contaminate the soils; any plant equipment found to be attributing to this shall be removed from the site and repaired.</li> </ul>

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>● In the event of a petrochemical (diesel, oil, fuels, etc.) spill, the Proponent must take suitable measures to contain the pollution and prevent it from spreading or seepage. Once the spill has been contained, contaminated material (soil, etc.) shall be removed and disposed of at a registered hazardous waste disposal site.</li> </ul>
Visual and Sense of Place	<ul style="list-style-type: none"> <li>● Visual pollutants can further be prevented through mitigations (i.e. keep existing trees, introduce tall indigenous trees;).</li> <li>● Quarries should be levelled once dimension stone mining activities cease so as to restore the visual sense of place of the area to its natural state.</li> <li>● The remains of all structures that may have been erected at the quarry shall be demolished and removed on completion of the project.</li> <li>● Care must be taken to ensure that all rehabilitated areas are similar to the immediate environment in terms of visual character, vegetation cover and topography and any negative visual impacts will be rectified to the satisfaction of the environmental consultant (HEEC CC) or MET officials.</li> <li>● Overburden will be placed back into excavation as part of the rehabilitation programme</li> </ul>
Noise	<ul style="list-style-type: none"> <li>● Continuous monitoring of noise levels should be conducted to make sure the noise levels at the dimension stone mining site does not exceed acceptable limits.</li> <li>● No activity having a potential noise impact should be allowed after 18:00 hours if possible.</li> <li>● In the event that activities continue outside the stipulated hours the contractor will communicate such occurrences to potentially affected communities prior to commencing such activities.</li> </ul>
Dust and Emission	<ul style="list-style-type: none"> <li>● It is recommended that dust suppressants such as Dustex be applied to all the dimension mining activities to ensure at least 50 % control efficiency on all the unpaved roads.</li> <li>● Vehicles used on site to only use designated roads.</li> <li>● The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used.</li> <li>● During high wind conditions the proponent must make the decision to cease works until the wind</li> </ul>



<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<p>has calmed down.</p> <ul style="list-style-type: none"> <li>● Cover any stockpiles with plastic to minimise windblown dust.</li> <li>● Provide workers with dust masks and other necessary PPE (dust masks, ear muffs, heavy duty gloves, steel toe shoes work suits, sun hats etc.).</li> <li>● Maintenance of the road leading to the mining claim sites so as to minimise the dust released when heavy trucks are travelling on the road.</li> <li>● Investigate the possibility of tarring the road leading to the mining claim for easy traffic movement.</li> </ul>
<b>Fauna and Flora</b>	<ul style="list-style-type: none"> <li>● Prevent the destruction of protected tree species.</li> <li>● Encourage the regeneration and regrowth of trees with exposed roots in the area.</li> <li>● Do not clear cut the entire MC 69151 site, but rather keep the few individuals and/or clumps of trees/shrubs as part of the landscaping especially important for shade in the hot climate.</li> <li>● The trees that are to be kept should be clearly marked with “danger tape” to prevent accidental removal. Regular inspection of the marking tool should be carried out.</li> <li>● The very important trees should be “camped off” to prevent the unintended removal or damage to these trees.</li> <li>● Recommend the planting of local indigenous species of flora as part of the landscaping as these species would require less maintenance than exotic species and have important ecological functions in terms of carbon sequestration from decomposing materials at the site.</li> <li>● Transplant removed trees where possible, or plant new trees in lieu of those that have been removed.</li> <li>● Prevent contractors who will be doing the mining from collecting wood and veld food such as amphibians, migrating birds, etc. during the dimension stone mining phase.</li> <li>● Prevent contractors from fishing in the local ephemeral rivers or catching aquatic species.</li> <li>● No workers will be allowed to collect any plant or snare, hunt or otherwise capture any animal. All animal life, vegetation, firewood etc., will remain the property of the Ministry of Environment &amp;</li> </ul>

<b>DIMENSION STONE MINING IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<p>Tourism or the custodian thereof and will not be disturbed, upset or used without their express consent.</p> <ul style="list-style-type: none"> <li>• No domestic animals will be permitted on the quarry sites by means of erecting a perimeter fence, small stock should graze at designated areas.</li> <li>• No animals shall be harmed during the course of dimension stone mining. Should snakes or dangerous wildlife be encountered, an expert must be called out to safely relocate them.</li> </ul>
Access roads to the site	<ul style="list-style-type: none"> <li>• Roads shall be ripped or ploughed, and if necessary, appropriately fertilised (based on a soil analysis) to ensure the regrowth of vegetation. If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the ECO may require that the soil be analysed and any deleterious effects on the soil arising from the mining operation, be corrected and the area be seeded with a seed mix to the suitable specifications.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>• The project management should be made aware of the provisions of the National Heritage Act regarding the prompt reporting of archaeological finds (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artifacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations), unmarked human burials or other categories of heritage resources are found during mining activities.</li> <li>• In the event of such finds, construction must stop and the project management or contractors should notify the National Heritage Council of Namibia immediately.</li> </ul>
Flooding	<ul style="list-style-type: none"> <li>• Dimension stone mining activities should be minimised during the rainy season to reduce the impacts of flooding at the mining site.</li> </ul>
Social Impacts	<p>No specific mitigation measures are required, only that the local community be consulted in terms of possible job creation opportunities and must be given first priority if unskilled job vacancies are available.</p>

**Table 9:** Proposed mitigation measures for the transportation phase

<b>TRANSPORTATION IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
Traffic	<ul style="list-style-type: none"> <li>• Limit and control the number of access points to the quarry sites.</li> <li>• Ensure that road junctions have good sightlines.</li> <li>• Vehicles' need to be in a road worthy condition and maintained throughout the dimension stone mining phase.</li> <li>• Transport the materials in the least amount of trips as possible.</li> <li>• Adhere to the speed limit.</li> <li>• Implement traffic control measures where necessary</li> </ul>
Existing Service Infrastructure	<ul style="list-style-type: none"> <li>• It is recommended that alternative and renewable sources of energy be explored and introduced into the employees' housing development to reduce dependency on the grid.</li> <li>• Solar geysers and panels should be considered to provide for general lighting and heating of water and buildings.</li> <li>• Water saving mechanisms should be incorporated within the dimension stone cutting design and plans in order to further reduce water demands.</li> <li>• Re-use of treated waste water should be considered wherever possible to reduce the consumption of potable water.</li> </ul>
Surface and Ground Water Impacts	<ul style="list-style-type: none"> <li>• No dumping of waste products of any kind in or in close proximity to surface water bodies.</li> <li>• Heavy excavation vehicles should be kept out of any surface water bodies and the movement of vehicles should be limited where possible to the existing roads and tracks.</li> <li>• Ensure that oil/ fuel spillages from vehicles transporting the stones and machinery are minimised and that where these occur, that they are appropriately dealt with.</li> <li>• Drip trays must be placed underneath vehicles when not in use to contain all oil that might be leaking from these vehicles.</li> <li>• Contaminated runoff from the mining claim sites should be prevented from entering the surface and ground water bodies.</li> </ul>

<b>TRANSPORTATION IMPACTS</b>	
<b>IMPACT</b>	<b>MITIGATION MEASURES</b>
	<ul style="list-style-type: none"> <li>• All materials on the site should be properly stored.</li> <li>• Disposal of waste from the sites should be properly managed and taken to the designated spaces for each particular type.</li> <li>• Workers should be given ablution facilities at the sites that are located at least 30 m away from any surface water and they should be regularly serviced.</li> <li>• Washing of personnel or any equipment should not be allowed on the mining claim site.</li> <li>• Should it be necessary to wash equipment these should be done at an area properly suited and prepared to receive and contain polluted waters.</li> </ul>
Health, Safety and Security	<ul style="list-style-type: none"> <li>• Personnel should not overnight at the mining claim site, except the security personnel.</li> <li>• Ensure that all mining personnel are properly trained depending on the nature of their work.</li> <li>• Provide for a first aid kit and a properly trained person to apply first aid when necessary.</li> <li>• A wellness program should be initiated to raise awareness on health issues, especially the impact of sexually transmitted diseases as described above.</li> <li>• Provide free condoms in the workplace and to local community throughout the dimension stone mining period and promote their usage.</li> <li>• Facilitate access to Antiretroviral (ARV) medication.</li> <li>• Encourage HIV counselling and testing.</li> <li>• Encourage Voluntary Medical Male Circumcision (VMMC).</li> <li>• Provide awareness on the prevention of mother to child HIV Transmission.</li> <li>• Restrict unauthorised access to the mining claim site and implement access control measures.</li> <li>• Clearly demarcate the mining claim site boundaries along with signage of “no unauthorised access”.</li> <li>• Clearly demarcate dangerous areas and no go areas on site.</li> <li>• Staff and visitors to the mining claim site must be fully aware of all health and safety measures and emergency procedures.</li> </ul>

TRANSPORTATION IMPACTS	
IMPACT	MITIGATION MEASURES
Noise	<ul style="list-style-type: none"> <li>• The contractor must comply with all applicable occupational health and safety requirements. The workforce should be provided with all necessary Personal Protective Equipment where appropriate.</li> <li>• No amplified music should be allowed on site.</li> <li>• Inform immediate residents of the nearby village/farm/settlement about the dimension mining activities to commence and provide for continuous communication between the residents and contractor.</li> <li>• Limit mining times to acceptable daylight hours.</li> <li>• Install technology such as silencers on the excavation machinery.</li> <li>• Do not allow the use of horns as a general communication tool, but use it only where necessary as a safety measure.</li> </ul>
Municipal Services	<ul style="list-style-type: none"> <li>• It is recommended that waste from the temporary toilets be disposed of at the designated waste treatment site in Opuwo.</li> <li>• A sufficient number of waste bins should be placed around the quarry site for the soft refuse.</li> <li>• The overburden and rubble should be deposited at designated spaces at quarry to allow for easy access by people who would want to reuse this rubble in other projects such as refilling pits.</li> <li>• Solid waste will be collected and disposed of on a regular basis at the designated spaces.</li> </ul>
Hazardous Substances	<ul style="list-style-type: none"> <li>• Storage of the hazardous substances in a bunded area, with a volume of 120 % of the largest single storage container or 25 % of the total storage containers whichever is greater.</li> <li>• Refuel vehicles in designated areas that have a protective surface covering and utilise drip trays for stationary plant.</li> </ul>
Social Impacts	<p>No specific mitigation measures are required, only that the local community be consulted in terms of possible job creation opportunities and must be given first priority if unspecialised job vacancies are available.</p>

## 8 CONCLUSION AND RECOMMENDATIONS

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*The purpose of this Chapter is to briefly summarise and conclude the FESR and describe the way forward.*

### 8.1 DIMENSION STONE MINING PHASE IMPACTS

With reference to **Table 7**, only one of the negative mining phase impacts was deemed to have a high significant impact on the environment i.e. impact on biodiversity. This impact was assessed to a **Medium to Low (negative)** with mitigation. The cumulative dimension stone mining impacts were assessed to a **Medium to Low (negative)** significance, without mitigation measures. With the implementation of the recommended mitigation measures in Chapter 7 as well as in the EMP, the significance of the dimension stone mining phase impacts is likely to be reduced to a **Low (negative)**.

The most significant impact **high (positive)** is the social impact directly associated with the increasing provision of job opportunities and the social upliftment accompanied by economic development through investing at the Oroutumba Village through a trust fund to be administered by the Traditional Authority who will prioritise their development needs. The intended activity aims to promote local economic development through attracting more investors that want to import dimension stones for further processing aimed at various uses.

### 8.2 LEVEL OF CONFIDENCE IN ASSESSMENT

With reference to the information available at the project planning cycle, the confidence in the environmental assessment undertaken is regarded as being acceptable for the decision-making, specifically in terms of the environmental impacts and risks. The Environmental Assessment Practitioner believes that the information contained within this FESR is adequate to allow MEFT: DEA to be able to determine the environmental acceptability of the proposed project.

It is acknowledged that the operational details will evolve during the detailed mining operations. However, these are unlikely to change the overall environmental acceptability of the operation of the dimension stone mining activities and any significant deviation from what was assessed in this FESR should be subject to further assessment. If this was to occur, an amendment to the Environmental Authorisation may be required in which case the prescribed process would be followed.

### 8.3 MITIGATION MEASURES

With the implementation of the recommended mitigation measures in Chapter 7 as well as in the EMP, the significance of the dimension stone mining phase impacts is likely to be reduced to a **Low (negative)**. **It is further extremely important to include an Environmental Control Officer (ECO) on site during the relevant phases of the intended mining activities to ensure that all the mitigation measures discussed in this report and the EMP are enforced.**

It is advised that the proponent strictly engages the guidelines outlined within the EMP with regards to the rehabilitation of the quarries once dimension stone excavation at the mining claim site has ceased so as to restore the area to its original state and to reduce the associated negative environmental impacts.

It is noted that where appropriate, these mitigation measures and any others identified by MEFT: DEA could be enforced as Conditions of Approval in the Environmental Authorisation, should MEFT: DEA issue a positive Environmental Authorisation.

### 8.4 OPINION WITH RESPECT TO THE ENVIRONMENTAL AUTHORISATION

Regulation 15(j) of the EMA, requires *that the EAP include an opinion as to whether the listed activity must be authorised and is the opinion is that it must be authorised, any condition that must be made in respect of that authorisation.*

It is recommended that the dimension stone mining operations be authorised, as the activities provide employment for the local people and contribute to local & national economic development through attracting more investors to the nearby village of Oroutumba and surrounding villages/settlements/farms and additionally increasing people's livelihoods through job creation.

The significance of the social impact on the residents of Oroutumba Village was deemed to be **High (positive)**. The significance of negative impacts can be reduced with effective and appropriate mitigation provided in this Report and the EMP attached in **Annexure G**. If authorised, the implementation of an EMP should be included as a condition of approval.

### 8.5 WAY FORWARD

The Final Environmental Scoping Report will be submitted to MEFT: DEA for consideration and decision making. If MEFT: DEA approves or requests additional information / studies all registered I& APs and stakeholders will be kept informed of progress throughout the assessment process.

## 9 REFERENCES

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